Remarks

Applicants respectfully request reconsideration of the present application in view of the foregoing amendments and the following remarks. Claims 1, 2, 4-10, 12-19, 21-28, 30, 31, 33-38, 40-51, and 53-55 are pending in the application. Claims 3, 11, 20, 29, 32, 39, 52, and 56 are cancelled without prejudice. Claims 1, 2, 4-10, 12-19, 21-28, 30, 31, 33-38, 40-51, and 53-55 are rejected. No claims have been allowed. Claims 1, 17, 24, 30, 38, 43, and 53 are independent. Claims 1, 4, 5, 17, 18, 24, 30, 38, 43, 48, and 53 have been amended.

Cited Art

The Action cites:

1. Panusopone et al., U.S. Patent No. 6,647,061 (hereinafter "the Panusopone patent");

2. H.264 - A New Technology for Video Compression (hereinafter "the Nuntius publication");

3. Intensity Controlled Motion Compensation (hereinafter "the Kari publication");

4. Microsoft Debuts New Windows Media Player 9 series (hereinafter "the MS Debuts publication"); and

5. Overview of MPEG-2 Test Model 5 (hereinafter "the TM5 publication").

Rejections under 35 U.S.C. § 101

The Action rejects claims 11, 20, 29, 32, 39, 52, and 56 under 35 U.S.C. § 101 as allegedly directed toward non-statutory subject matter. Applicants respectfully traverse this rejection, but in the interest of expediting prosecution, Applicants have cancelled claims 11, 20, 29, 32, 39, 52, and 56 without prejudice. Therefore, the rejection is moot.

Claim Rejections under 35 U.S.C. § 102

The Action rejects claims 1, 2, 7, 8, 10, 12-15, 17, 18, 21-28, 30, 33, 35-38, 40-43, 47, 48, 50, 51, and 53 under 35 U.S.C. 102(e) as being anticipated by the Panusopone patent. Applicants respectfully submit the claims are allowable over the cited art. Accordingly, applicants request that all rejections be withdrawn.

Claim 1

Claim 1, as amended, recites:

> wherein the independently making the second coding decisions includes: *using intensity compensation to scale and/or shift values in a reference picture*; and
>
> *performing motion estimation to compute plural new motion vectors to be used in motion compensation, each of the plural new motion vectors referencing the reference picture*, wherein, for at least one of the plural new motion vectors, use of motion vector information from the compressed video in the source format speeds up the motion estimation by guiding searching in a motion estimation search area.

[Emphasis added.] The Application provides examples of motion estimation in some example implementations at Section III:

> A target format encoder re-compresses (530) the uncompressed video, producing target format compressed video. In doing so, the encoder uses the re-coding data set elements when making coding decisions. . . . *[T]he encoder computes new motion vectors for motion compensation with . . . intensity compensation* . . . so as to improve motion compensated prediction and thereby reduce bitrate for prediction residuals. *Motion vector information from the source format compressed video may be used in some motion estimation decisions (e.g., to speed up estimation by providing start points) and ignored in other motion estimation decisions (e.g., to find the exact motion vectors in view of loop filtering, intensity compensation, etc.).*

[Application, at page 16, lines 9-24; emphasis added.] The Application further provides examples of intensity compensation in some example implementations in Section VI.I:

> 7. Intensity Compensation
>
> Intensity compensation allows re-mapping of pixels in reference pictures to scale and/or shift pixel values. This can help conserve bits in fade-in and fade-out sequences. Although MPEG-2 does not use intensity compensation, the transcoder allows intensity compensation in the WMV9 encoder

[Application, at page 31, lines 5-9.] Finally, the Application describes examples of speeding up motion estimation using source-encoded motion vectors in some example implementations:

> Motion vector information signaled in the MPEG-2 bitstream may be used as a starting point for motion estimation in the WMV9 encoder during transcoding, potentially speeding up the motion estimation process in the WMV9 encoder. *With MPEG-2 motion vectors as a guide, the WMV9 encoder may also reduce the size of the motion estimation search area.*

[Application, at page 32, lines 4-8; emphasis added.] Applicants also note that some of the above-quoted language of claim 1 originally appeared in (now cancelled) claim 3, which was also rejected under § 102 over the Panusopone patent.

The Panusopone patent does not teach or suggest, and in fact teaches away from, "performing motion estimation to compute plural new motion vectors" and "use of motion vector information from the compressed video in the source format speeds up the motion estimation by guiding searching in a motion estimation search area*" because the MPEG-2 to MPEG-4 transcoding described in the Panusopone patent either merely reuses or simply modifies motion vectors from the source MPEG-2 bitstream in a deterministic way.* Applicants note first that claim 3 as originally filed recited language very similar to the "motion estimation" language quoted immediately above. In its rejection of claim 3, the Action states the following:

> Regarding claim 3, in Panusopone et al., motion compensation function 440 operates from the re-encoded, quantized DCT values from the coder (column 7: lines 61-67) and scaled MVs from the MV decoder 425 (figure 4A).

[Action at page 8, paragraph 3.] Applicants note first that, while Figure 4A does show an output from an "MV Decoder" 425, this output is simply used as input to motion compensation for the purpose of generating residual data during encoding. Secondly, Applicants note that, while there are instances in the Panusopone patent where scaled motion vectors are created from motion vectors, these involve simple direct manipulation of an existing motion vector into a scaled version. Applicants fail to find any teaching in the Panusopone patent where "use of motion vector information from the compressed video in the source format speeds up the motion estimation by guiding searching in a motion estimation search area."

The Panusopone patent in fact teaches away from such a search. In its description of a "low complexity front-to-back transcoder" illustrated in Figure 3, the Panusopone patent explains the desirability of *avoiding* a motion estimation process:

> Similarities between the structures of MPEG-2 and MPEG-4 allow a low complexity (front-to-back) transcoder. *Instead of completely decoding* an MPEG-2 bitstream to the spatial (pixel) domain level, *the front-to-back transcoder 300 uses DCT coefficients and MVs to generate an MPEG-4 bitstream without actually performing a motion estimation process.*

[Panusopone patent, at column 6, lines 27-33; emphasis added.] Later on, the Panusopone patent again stresses the lengths its described processes will go to avoid performing motion estimation:

> *ME is the bottleneck of the entire video encoding process. It is hence desirable to estimate a MV of the resized MB by using MVs of four original MBs without actually performing ME* (assuming that all MBs are coded in inter mode). Note that, if an MPEG-2 bitstream is assumed, subsampling of MV data takes MVs of four MBs since each MB has one input (only an MPEG-4 bitstream can have a MV for every block). The simplest solution is to average four MVs together to obtain the new MV but it gives a poor estimate when those four MVs

> are different. B. Shen, I. K. Sethi and B. Vasudev, "Adaptive Motion-Vector Resampling For Compressed Video Downscaling," IEEE Trans. Circ. and Syst. For Video Technol., vol. 9, pp. 929-936, September 1999, show that a better result can be obtained by giving more weight to the worst predicted MV. A matching accuracy, A, of each MV is indicated by the number of nonzero AC coefficients in that MB. By using the Shen et al. technique, the new MV for the downscaled MB can be computed [through a direct formula].
>
> M. R. Hashemi, L. Winger and S. Panchanathan, "Compressed Domain Motion Vector Resampling For Downscaling Of MPEG Video," ICIP 99, propose a nonlinear method to estimate the MV of the resized MB. Similar to the algorithm in Shen et al., Hashemi's technique uses spatial activity of the processing MBs to estimate the new MV. A heuristic measurement, called Maximum Average Correlation (MAC) is employed in Hashemi's method to identify one of the four original MVs to be the output MV.

[Panusopone patent, at column 17, line 56 to column 18, line 24; emphasis added.] Hence, at it's most complex, the Panusopone patent teaches grabbing one of four original motion vectors rather than using these vectors to "guid[e] searching in a motion estimation search area" as recited in claim 1. As such, the Panusopone patent appears to teach directly away from such a search or from being modified to perform such a search. For at least these reasons, Applicants believe that the Panusopone patent does not teach or suggest "performing motion estimation to compute plural new motion vectors" and "use of motion vector information from the compressed video in the source format speeds up the motion estimation by guiding searching in a motion estimation search area," as recited in claim 1.

The Panusopone patent, alone or in combination with the Nuntius and Kari publications, also does not teach or suggest "using intensity compensation to scale and/or shift values in a reference picture," as recited in claim 1. While claim 1 was rejected in the Action only under § 102 considering the Panusopone patent, Applicants note that the "using intensity compensation to scale and/or shift values" language with which it is amended is similar to language originally found in claim 4, which was rejected under 35 U.S.C. § 103(a) as being unpatentable over the Panusopone patent in view of the Nuntius publication and further in view of the Kari publication. [*See*, Action at § 9, page 12, paragraph 1.] In its rejection of claim 4, the Action acknowledges that the Panusopone patent, in combination with the Nuntius publication, does not teach "performing intensity compensation" but finds this in the Kari publication. [*Id.*, at paragraph 3.]

Applicants respectfully traverse this finding. The Kari publication, which is entitled "Intensity controlled motion compensation" is for a "motion compensation technique" that "uses . . . intensity information to determine which motion vector to apply at any given pixel." [Kari

publication, at Abstract.] Applicants respectfully note the contrast between the Kari publication's process, which helps choose a motion vector based on intensity information, and the claimed language, which uses "intensity compensation to scale and/or shift values in a reference picture." As the technology described in the Kari publication and the language of claim 1 involve entirely different data (e.g. motion vectors vs. reference picture values), Applicants respectfully argue that the Kari publication cannot teach or suggest the above-quoted language of claim 1.

For at least these reasons, the Panusopone patent does not teach or suggest each and every element of claim 1. In addition, even when taken in combination with the Nuntius publication and the Kari publication, the Panusopone patent fails to teach or suggest each and every element of claim 1. Claim 1, as well as claims 2, 7, 8, 10, and 12-15, which depend from claim 1, are thus allowable, and Applicants request their allowance. Applicants will not belabor the merits of the separate patentability of dependent claims 2, 7, 8, 10, and 12-15.

Claim 17

Claim 17, as amended, recites:

> the re-compressing the video includes performing intensity compensation to scale and/or shift values in a reference picture, and wherein for each of plural new motion vectors the motion estimation uses motion vector information from the compressed video in the first format to speed up searching for the new motion vector in a motion estimation search area.

For at least the reasons discussed above with respect to the above-quoted language of claim 1, the Panusopone patent does not teach or suggest the above-quoted language of claim 17. In addition, even when taken in combination with the Nuntius publication and the Kari publication, the Panusopone patent fails to teach or suggest each and every element of claim 17. Claim 17, as well as claims 18 and 21-23, which depend from claim 17, are thus allowable and Applicants request their allowance. Applicants will not belabor the merits of the separate patentability of dependent claims 18 and 21-23.

Claim 24

Claim 24, as amended, recites:

> wherein the making the coding decisions during the re-compressing further includes:
>
> using intensity compensation to scale and/or shift values in a reference picture; and
>
> performing motion estimation to compute plural new motion vectors to be used in motion compensation, each of the plural new motion vectors referencing the reference picture, wherein, for at least one of the plural new motion vectors, use of motion vector information from the compressed video in the source format speeds up the motion estimation by guiding searching in a motion estimation search area.

For at least the reasons discussed above with respect to the above-quoted language of claim 1, the Panusopone patent does not teach or suggest the above-quoted language of claim 24. In addition, even when taken in combination with the Nuntius publication and the Kari publication, the Panusopone patent fails to teach or suggest each and every element of claim 24. Claim 24, as well as claims 25-28, which depend from claim 24, are thus allowable and Applicants request their allowance. Applicants will not belabor the merits of the separate patentability of dependent claims 25-28.

Claim 30

Claim 30, as amended, recites:

> re-compressing the video to produce compressed video in a second format, including ... performing motion estimation to generate plural new motion vectors by, for each of the plural new motion vectors, using motion vector information from the compressed video in the first format to guide searching in a motion estimation search area, ... wherein the re-compressing further includes using intensity compensation to scale and/or shift values in one or more reference pictures used with the plural new motion vectors.

For at least the reasons discussed above with respect to the above-quoted language of claim 1, the Panusopone patent does not teach or suggest the above-emphasized language of claim 30. In addition, even when taken in combination with the Nuntius publication and the Kari publication, the Panusopone patent fails to teach or suggest each and every element of claim 30. Claim 30, as well as claims 33 and 35-37, which depend from claim 30, are thus allowable and Applicants

request their allowance. Applicants will not belabor the merits of the separate patentability of dependent claims 33 and 35-37.

Claim 38

Claim 38, as amended, recites:

> re-compressing the video to produce compressed video in a second format, including ... performing motion estimation to generate plural new motion vectors by, for each of the plural new motion vectors, using motion vector information from the compressed video in the first format to guide searching in a motion estimation search area, ... wherein the re-compressing further includes using intensity compensation to scale and/or shift values in one or more reference pictures used with the plural new motion vectors.

For at least the reasons discussed above with respect to the above-quoted language of claim 1, the Panusopone patent does not teach or suggest the above-emphasized language of claim 38. In addition, even when taken in combination with the Nuntius publication and the Kari publication, the Panusopone patent fails to teach or suggest each and every element of claim 38. Claim 38, as well as claims 40-42, which depend from claim 38, are thus allowable and Applicants request their allowance. Applicants will not belabor the merits of the separate patentability of dependent claims 40-42.

Claim 43

Claim 43, as amended, recites:

> re-compressing the video to produce compressed video in a second format, including ...performing motion estimation to generate plural new motion vectors by, for each of the plural new motion vectors, using motion vector information from the compressed video in the first format to guide searching in a motion estimation search area, ... wherein the re-compressing uses intensity compensation to scale and/or shift values in one or more reference pictures used by the plural new motion vectors created during the motion estimation.

For at least the reasons discussed above with respect to the above-quoted language of claim 1, the Panusopone patent does not teach or suggest the above-emphasized language of claim 43. In addition, even when taken in combination with the Nuntius publication and the Kari publication, the Panusopone patent fails to teach or suggest each and every element of claim 43. Claim 43, as well as claims 47, 48, 50, and 51, which depend from claim 43, are thus allowable and

Applicants request their allowance. Applicants will not belabor the merits of the separate patentability of dependent claims 47, 48, 50, and 51.

Claim 53

Claim 53, as amended, recites:

> re-compressing the video to produce compressed video in a second format using a second format encoder with default one-pass variable bitrate encoding, including ... performing motion estimation to generate plural new motion vectors by, for each of the plural new motion vectors, using motion vector information from the compressed video in the first format to guide searching in a motion estimation search area, ... wherein the re-compressing further includes using intensity compensation to scale and/or shift values in one or more reference pictures used with the plural new motion vectors.

For at least the reasons discussed above with respect to the above-quoted language of claim 1, the Panusopone patent does not teach or suggest the above-emphasized language of claim 53. In addition, even when taken in combination with the Nuntius publication and the Kari publication, the Panusopone patent fails to teach or suggest each and every element of claim 53. Claim 53 is thus allowable and Applicants request its allowance.

Claim Rejections under 35 U.S.C. § 103(a)

The Action rejects claims 5, 6, 9, 19, 31, 46, and 49 under 35 U.S.C. § 103(a) as being unpatentable over the Panusopone patent in view of the Nuntius publication. Each of claims 5, 6, and 9 depend from independent claim 1, claim 19 depends from independent claim 17, claim 31 depends from independent claim 30, and each of claims 46 and 49 depends from independent claim 43. As explained above, the Panusopone patent, in combination with the Nuntius publication, does not teach or suggest each and every element of claims 1, 17, 30, and 43, respectively, and thus does not teach or suggest each and every element of any of claims 5, 6, 9, 19, 31, 46, and 49. For at least this reason, dependent claims 5, 6, 9, 19, 31, 46, and 49 should be allowable. Applicants will not belabor the merits of the separate patentability of dependent claims 5, 6, 9, 19, 31, 46, and 49.

The Action, as discussed above, rejects claim 4 under 35 U.S.C. § 103(a) as being unpatentable over the Panusopone patent in view of the Nuntius publication and further in view of the Kari publication. Claim 4 depends from independent claim 1. As explained above, the Panusopone patent, in combination with the Nuntius publication and the Kari publication, does

not teach or suggest each and every element of claim 1 and thus does not teach or suggest each and every element of claim 4. For at least this reason, dependent claim 4 should be allowable. Applicants will not belabor the merits of the separate patentability of dependent claim 4.

The Action rejects claim 16 under 35 U.S.C. § 103(a) as being unpatentable over the Panusopone patent in view of the MS Debuts publication. Claim 16 depends from independent claim 1. As explained above, the Panusopone patent, in combination with the Nuntius publication and the Kari publication, does not teach or suggest each and every element of claim 1 and thus does not teach or suggest each and every element of claim 16. The MS Debuts publication describes a release of Windows Media Video 9 player but fails to remedy this deficiency of the rejection. For at least this reason, dependent claim 16 should be allowable. Applicants will not belabor the merits of the separate patentability of dependent claim 16.

The Action rejects claims 34, 44, 54, and 55 under 35 U.S.C. § 103(a) as being unpatentable over the Panusopone patent in view of the TM5 publication. Claim 34 is dependent from independent claim 30, claim 44 is dependent from independent claim 43, and each of claims 54 and 55 is dependent from independent claim 53. As explained above, the Panusopone patent does not teach or suggest language recited in independent claims 30, 43, and 53, respectively, and therefore does not teach or suggest each and every element of any of claims 34, 44, 54, and 55. The TM5 publication fails to remedy this shortcoming. The TM5 publication describes "the main rate control model for MPEG-2" (*see* Action, at page 13, § 11) but, taken separately or in combination with the Panusopone patent, still fails to teach or suggest the above-cited language of claims 30, 43, and 53, respectively. For at least this reason, dependent claims 34, 44, 54, and 55 should be allowable. Applicants will not belabor the merits of the separate patentability of dependent claims 34, 44, 54, and 55.

Interview Request

If the claims are not found by the Examiner to be allowable, the Examiner is requested to call the undersigned attorney to set up an interview to discuss this application.

Conclusion

The claims in their present form should be allowable. Such action is respectfully requested.

Respectfully submitted,

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